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(21) International Application Number: PCT/IL98/00204 (22) International Filing Date: 29 April 1998 (29.04.98) (30) Priority Data: 120754 1 May 1997 (01.05.97) IL (71) Applicant (for all designated States except US): YEDA RESEARCH AND DEVELOPMENT CO. LTD. [IL/IL]; P.O. Box 95, 76100 Rehovot (IL). (72) Inventors; and (75) Inventors/Applicants (for US only): DANZIGER, Yochay [IL/IL]; Sdeh Nachum Street 5/26, 75284 Rishon LeZion (IL). FRIESEM, Asher, A. [IL/IL]; Weizmann Institute of Science, Neve Metz 15, 76100 Rehovot (IL). ORON, Ram [IL/IL]; Busel Street 26, 76404 Rehovot (IL). (74) Agent: COLB, Sanford, T.; Sanford T. Colb & Co., P.O. Box 2273, 76122 Rehovot (IL).		(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published With international search report. <i>This paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" under 37 CFR § 1.10 Mailing Label No. EM 341130 405US</i>

(54) Title: OPTICAL RESONATORS WITH DISCONTINUOUS PHASE ELEMENTS**(57) Abstract**

A discontinuous phase element (86, 204) is disposed between the reflector (20, 23) elements of an optical resonator in order to suppress unwanted modes propagating within the cavity, and to preferentially allow the existence of preferred modes within the cavity. The discontinuous phase element (204) operates by producing sharp changes in the phase distribution of the undesirable modes, so that their propagation losses are sufficiently high prevent their build-up. This is achieved by introducing a discontinuous phase change to these modes at locations where they have high intensity. At the same time, the desired modes suffer 0 or 2π phase change, or have low intensity at the discontinuity, and so are unaffected by the discontinuous phase element. Such elements can be used in a single element or a double element configuration, and can be used in passive cavities or active cavities, such as lasers. In addition to being able to improve the output beam quality of a laser by encouraging output of the lowest order mode beam, they can also be used to improve the maximum power output of solid state lasers by encouraging the output of specific higher order mode beams, without limiting dynamic range of the laser. They can also be used to compensate for birefringence distortion in the gain medium.

